Ann D. Berkowitz
Associate Director – Federal Affairs

1300 I Street, NW
Suite 400 West
Washington, DC 20005
(202) 515-2539
(202) 336-7922 (fax)

February 4, 2004

Ex Parte

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: WC Docket No. 03-173

Dear Ms. Dortch:

Yesterday, Karen Zacharia, James Green, Professors Dennis Carlton, Robert Solow, Robert Pindyck and Donna Epps represented Verizon in separate meetings with Commissioner Martin, Daniel Gonzalez and Jason Williams; Commissioner Abernathy and Matthew Brill; and Chairman Powell and Christopher Libertelli. The purpose of the meeting was to discuss two academic papers which address the importance of proper UNE pricing to carrier incentives and economic growth, as well as the appropriate costs that UNE rates should reflect. The academic papers and related handouts are attached.

Sincerely,

cc: M. Brill
D. Gonzalez
C. Libertelli
J. Williams

Robert S. Pindyck

INVESTMENT DISINCENTIVES IN TELRIC PRICING

February 3, 2004

1. Mandatory unbundling leads to an asymmetric sharing of risk between incumbents and entrants. TELRIC pricing does not account for this transfer of value from incumbents to entrants.

   - *Entrants can lease incumbents' equipment over short periods of time, and at will.*
   - *Thus, entrants benefit from incumbents' network investment in good times, but do not share in losses during bad times.*
   - *This creates a transfer of value ("Option Value") from incumbent to entrant.*
   - *TELRIC pricing does not compensate the incumbent for this transfer of value.*

2. The magnitude of this transfer of value is significant.

   - *Telecom markets are subject to considerable volatility and uncertainty.*
   - *Telecom investment is largely irreversible, i.e., a sunk cost.*

- *Thus, there is considerable value to entrants being able to utilize the incumbent's capital at will, without having to commit.*

3. This creates an investment disincentive that reduces capital investment by incumbents – and by entrants.

   - *Under TELRIC pricing, this transfer of value reduces an incumbent's returns from capital investment.*

   - *Incumbents invest less in network infrastructure.*

   - *TELRIC reduces the relative price of renting versus building, so entrants also have less incentive to invest.*

4. Remedy: increase the cost of capital in TELRIC.

   - *Current cost of capital as it appears in TELRIC does not account for this asymmetric burden of risk and resulting transfer of value.*

   - *Required rates of return for this type of irreversible investment are higher than the firm's cost of capital.*

   - *An addition to the cost of capital used in TELRIC is necessary to ensure that the incumbent is properly compensated.*

   - *This would restore the incentive to invest – by both the incumbent and entrants – to maintain, upgrade, and expand telecom networks.*

The telecommunications sector has been an important source of productivity growth and technological change.

- New telecommunications services have resulted in rapid gains in consumer welfare:
  - The number of wireless telephone subscribers grew from 5 million in 1990 to more than 140 million today.
  - The number of Internet subscribers grew from 20 million in 1995 to more than 150 million in 2002, including nearly 20 million broadband subscribers.
- New telecommunications services improve management and productivity in other industries.
- Regulation-related delays in the deployment of new technologies adversely affect consumer welfare and productivity growth.

The development and deployment of new telecommunications services requires investment and protection of property rights

- Innovation results from investments in R&D and expenditures to bring new products to market
- Government plays a key role in ensuring that property rights in new products are services are protected.
- Regulations that do not adequately protect property rights discourage investments that enhance consumer welfare

LEXECON

Regulators face difficult tasks in defining the appropriate price and conditions under which incumbent telephone companies provide entrants with access to network elements.

- If prices for network elements are set too low then investment in network upgrades and deployment of new services by incumbent carriers will be discouraged.

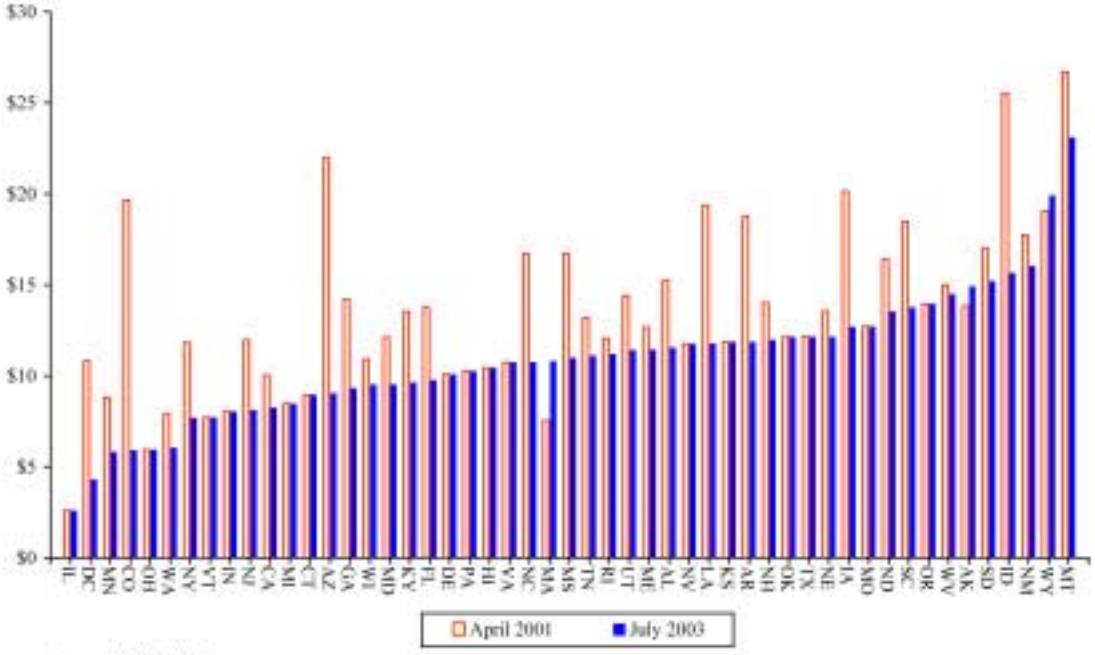
- Under these conditions, investment by competitive carriers also will be discouraged, which instead will choose to lease incumbents' facilities.

Regulators' tasks become more difficult, and are likely to have greater adverse consequences, during times of rapid technological change.

- For example, the appropriate price for network elements depends on its economic life. However, new competition can leave economic life shorter than physical life.

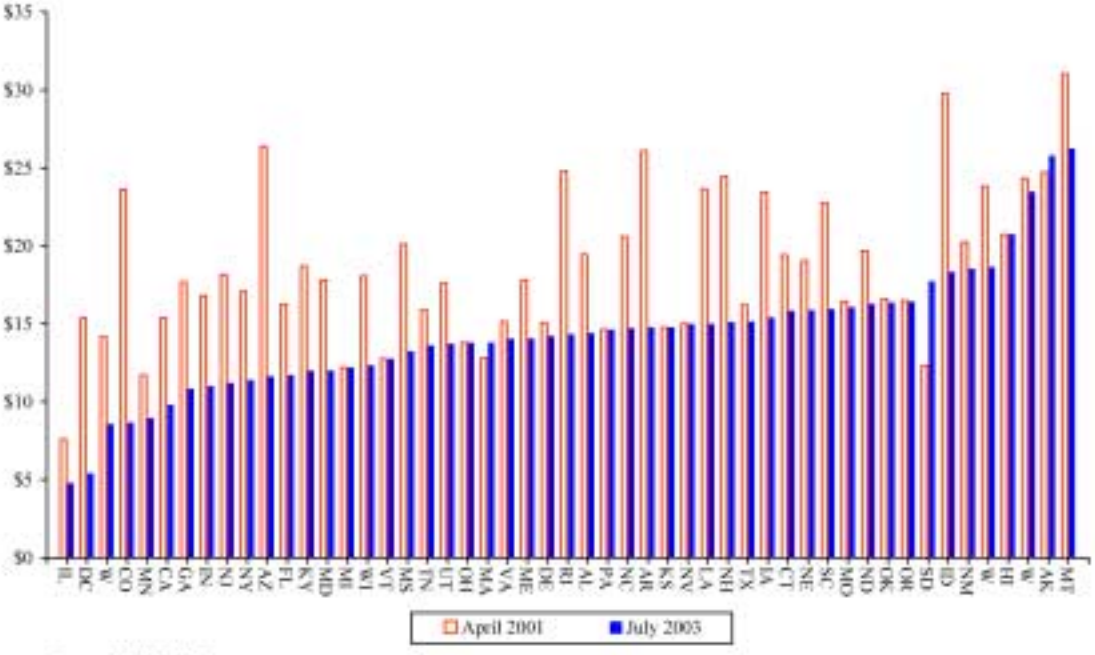
- Even intelligent and well-meaning regulators can make mistakes. The difficulty is reflected in the dispersion and changes in the prices of network elements.

UNE Urban Loop Rates: April 2001 and July 2003



Source: NRRI UNE Surveys.

UNE-P Urban Rate: April 2001 and July 2003



Source: NRRI UNE Surveys.

LEXECON

A major goal of the Telecommunications Act of 1996 was to foster facilities-based competition. This goal hasn't been realized.

- Unbundling and resale obligation may be a useful means to facilitate the transition to facilities-based competition.

- However, most entry into the provision of local services, especially to residential customers, instead reflects a form of resale competition known as UNE platform.

- Resale increases competition only for elements of telephone services, such as customer service and marketing, that are provided by the entrant.

- Resale competition through UNE platform resulting from mispriced network elements is properly considered a form of regulation-induced arbitrage, not competition.

Complexities and tensions in regulation can distort investment decisions.

- Regulators' failure to adequately account for risks can deter investment.
    - Some investments succeed, others fail. The return on successful investments must cover the costs associated with failed investments.
    - Investment in maintaining and upgrading the telephone network will be discouraged if prices for network elements reflect only the costs associated with successful investments.

Complexities and tensions in regulation can distort investment decisions.

- Tension between state and federal regulation can deter investment

  - State regulators traditionally finance universal service through cross-subsidies. For example, prices are set so that incumbents earn high margins on urban consumers while rural consumers pay prices that generate little or no margin.

  - Under these circumstances, cost-based prices for network elements can induce entry by inefficient firms in urban areas.

  - Such circumstances distort investment decisions by incumbents and entrants.

Complexities and tensions in regulation can distort investment decisions.

- Tension between network element pricing rules and unbundling rules can deter investment.
    - Entry is deterred if the regulated price of network elements is set too low.
    - Regulators may eliminate incumbents' unbundling obligations only if sufficient entry has occurred in an area.
    - Thus, pricing errors by regulators can perpetuate incumbents' unbundling obligations, distorting investments by both incumbents and entrants.

LEXECON

Report of

Kenneth Arrow, Gary Becker,
Dennis Carlton and Robert Solow

On Behalf of
Verizon

332 S. Michigan Avenue
Chicago, IL 60604-4306
Phone: 312.322.0200
Fax: 312.322.0218
www.lexecon.com

November 18, 2003

I. INTRODUCTION

Technological change and productivity increases are key determinants of economic growth and consumer welfare. Many telecommunications products and services that are widespread today did not exist or were in limited use two decades ago, including the Internet, wireless phones, high-speed data networks, fax machines, voice mail, and video conferencing. To cite just two examples:

- In ten years, the number of wireless voice subscribers increased by roughly 1200 percent, to 141 million in December 2002. Annual wireless minutes of use increased more than 40-fold over this period from 14 billion to 620 billion in 2002. In 2002, almost 90 percent of wireless service was provided over (higher quality) digital networks compared with only two percent of service in 1995.[1]
- Growth in Internet access has been similar. In April 2002, 166 million people had Internet access compared with only 18 million in 1995. The number of subscribers to broadband Internet services (including cable modem services and ILEC-provided DSL services) increased from less than three million in December 1999 to nearly 20 million in December 2002.[2]

---

1. Cellular Telecommunications & Internet Association, "Wireless Industry Indices," April 2003.
2. FCC, High-Speed Services for Internet Access: Status as of December 31, 2002, June 2003, Table 1.

The benefits of these new products extend beyond those derived from their direct use. Telecommunications is an input into virtually all industries, so new telecommunications products and improvements in the productivity of the telecommunications industry spill over into other industries through declining prices for telecommunications services and improvements in communications. Wireless phones, e-mail, data networks, fax machines and other new technologies have fundamentally altered how individuals and firms communicate, improving firms' productivity and increasing consumer welfare.

Telecommunications and other industries in which computer technology is an important input have contributed significantly to the growth of the U.S. economy. The average annual rate of output growth in the communications industry between 1958 and 1996 was five percent, one of the highest of all industries, while the growth in labor productivity (output per unit of labor input) was 3.9 percent, again, one of the highest of all industries.[3] Between 1995 and 1999, the growth in total factor productivity ("TFP") which reflects output relative to all inputs used in production) tripled, due largely to the growth of information technology.[4]

Government policies affect incentives for firms to undertake risky research and development and investment in physical and human capital to bring new products and services to market. Inappropriate regulation of prices, rates of return, entry conditions, and property rights can lessen firms' incentives to invest. Eliminating burdensome regulations can result in large increases in investment and rapid technological advancement.

---

3. Jorgenson, Dale and Stiroh, Kevin, "Raising the Speed Limit: U.S. Economic Growth in the Information Age," Brookings Papers on Economic Activity, 2000, v.1, p. 175. The 3.93 percent growth reflects the effects of both total factor productivity growth and capital investment.
4. Jorgenson, Dale, "Information Technology and the U.S. Economy," American Economic Review, vol. 91 (March 2001), p. 23.

It is our view that current telecommunications regulations threaten to reduce the pace of technological gains by reducing the incentives of incumbent local exchange carriers ("ILECs") and competitive local exchange carriers ("CLECs") to invest in new services and to upgrade their networks. While "unbundling" rules that require ILECs to lease components of their networks to rivals at regulated rates can foster competition under some circumstances, improper implementation of such requirements can deter investment by both ILECs and CLECs. This, in turn, can delay facilities-based competition, which is the form of competition most likely to result in new product introductions, more productive telecommunications networks and increases in consumer welfare.

When, as today, new telecommunications technologies are emerging rapidly, firms must decide whether to make large and risky investments in these new technologies. These are precisely the circumstances in which there is an increased likelihood that inappropriate regulation will adversely affect productivity growth and consumer welfare. Of great concern to us is that during periods of rapid technological change, regulators' task of setting the economically appropriate prices for network elements that must be unbundled is subject to substantial error. If these prices are to send the proper economic signals, they must reflect the true economic lives of investments, which can be highly uncertain in periods of rapid progress. The wide disparity across states in prices of the same unbundled network elements suggests that regulators exercise wide discretion in setting prices and that, as a result, ILECs and CLECs often do not face economically appropriate price signals.

ILEC incentives to upgrade their networks and introduce new services is further weakened by cross-subsidies in state-regulated retail rates for telephone services, which can exacerbate the problem of setting appropriate prices for unbundled network elements. These cross-subsidies are created by state regulations that set retail rates that do not properly reflect the

cost of providing service. Such cross-subsidies create opportunities for firms to enter into the provision of local telephone service using unbundled network elements to serve customers for whom retail rates are high relative to the cost of providing service, even if the entrants are less efficient than ILECs.

Although these concerns have been recognized for years, they have not been fully addressed by federal or state regulators. While the Federal Communication Commission's recent Order in its Triennial Review proceedings acknowledges problems relating from the diverse regulations now faced by ILECs, we are concerned that the regulatory climate will deter investment. We submit this report in order to encourage the development of regulations that promote consumer welfare by creating incentives for ILECs and CLECs to invest in providing new services and upgrading their networks.

II. INNOVATION, INVESTMENT AND PRODUCTIVITY IMPROVEMENT ARE CRITICAL DETERMINANTS OF ECONOMIC GROWTH AND CONSUMER WELFARE

Productivity growth and the introduction of new products are responsible for dramatic increases in consumer welfare. Innovation is essential in stimulating productivity growth, as are the investments required to bring innovations to the market. As noted in the examples above, innovations in telecommunication services in recent years have resulted in tremendous increases in consumer welfare. Obtaining these gains required large investments by ILECs and other telecommunications firms.

A. THE RATE OF TECHNOLOGICAL CHANGE IN TELECOMMUNICATIONS HAS INCREASED IN RECENT YEARS

Over the last several decades, the telecommunications industry has changed at an increasingly rapid pace. While the growth of the Internet provides one important example, the acceleration in changes in infrastructure, products and services have occurred throughout the telecommunications industry.

Cellular Wireless Service

Commercial car phones were introduced in the U.S. in 1946.[5] The first generation of portable cell phones did not begin commercial service until 1983, 37 years later.[6] The second generation followed roughly 15 years later as networks switched from analog to digital transmission technologies.[7] The third generation ("3G") was introduced fewer than seven years after the introduction of digital; this technology permits video, graphics and data to be transmitted, as well as voice messages.[8] Thus, each new generation of technology appeared in less than half the time required by the previous generation of technology.

Central Office Switching

Central office switching followed a similar pattern. Telephone lines from homes and businesses run to a central office, where switches collect many individual calls and route them towards their termination. The original switches were run by human switchboard operators. By the 1930s, electromechanical switches that required no human operator were widely available. The first non-mechanical switch, called an analog switch, was installed in 1965, more than 30 years later. Widespread deployment of digital switching began in the early 1980s, roughly 20 years later. It took twenty years for local phone companies to convert two-thirds of their networks to analog from electromechanical, but they accomplished a similar transition to digital

5. Peterson, A.C., Jr., "Vehicle Radiotelephony Becomes a Bell System Practice." Bell Laboratories Record, April 1947, p.137.
6. Davis, John H., "Cellular Mobile Telephone Services," in Managing Innovation: Cases from the Services Industry, Bruce Guile and James Quinn (editors), National Academy of Engineering Series on Technology and Social Priorities, National Academy Press, Washington, D.C., 1988, p.161.
7. See the Federal Communication Commission's Commercial Mobile Radio Service Competition Reports, 1995 (95-317), 1997 (97-75), and 1998 (98-91).
8. For example, Verizon Wireless launched its 3G service in New York on June 28, 2002 (http://news.vzw.com/news/2002/06/pr2002-06-28.html). Cingular launched a transitional 2.5G service in California on April 2002 with plans to provide full 3G in 2003 (http://www.cingular.com/about/latest_news/02_04_17).

in half that time.[9] Today, the Bell companies are beginning to replace digital switches with packet switches in central offices; packet switches already are used throughout backbones and data networks.[10]

Computer Modems

The first commercial analog modem was introduced in 1962, with a transfer speed of 300 bits per second. The increase in speed in subsequent years was dramatic – from 1.2 kilobits per second (kbps) in 1985 to 14.4 kbps in 1991, and 56 kbps in 1998. The most recent advance in speed is digital modems, including DSL and cable modems, which became commercially available in the mid-to-late 1990s and increased transfer speeds by an order of magnitude or more.[11]

Fiber Optic Capacity

Fiber optic infrastructure has been used for decades, but until recently only in very limited quantities. Between 1985 and 1996, long distance fiber optic infrastructure grew roughly six fold.[12] Between 1996 and 2001, the amount of long-distance fiber optic infrastructure increased roughly six-fold again.[13] However, the capacity of telecommunications networks increased much more than these figures imply due to the development of electronics capable of transmitting larger amounts of information in a given optical fiber. Network technologies, such

9. Shampine, Allan, "Determinants of the diffusion of U.S. digital telecommunications." Journal of Evolutionary Economics (2001) 11: 249-261.
10. Shampine, Allan, "The Evolution of Telecommunications Switching in the Central Offices Worldwide," in Down to the Wire: Studies in the Diffusion and Regulation of Telecommunications Technologies, Allan Shampine (editor), Nova Science Publishers, Hauppauge, New York, 2003.
11. See, www.about.com, www.howstuffworks.com, www.afterzed.com, www.inventors.about.com.
12. FCC, Fiber Deployment Update End of Year 1998, September 9, 1999, Table 2.
13. KMI Corporation, Fiberoptic Networks of Long-Distance Carriers in North America: Market Developments and Forecasts, November 1999, p. A-1.

as Dense Wave Division Multiplexing ("DWDM"), were projected to allow a 100-fold increase in U.S. fiber backbone capacity between 1997 and 2000.[14] New network technologies permit even greater increases in capacity.[15]

ILECs played a key role in introducing many new technologies and services. They increased deployment of fiber optics in their local networks.[16] They have been leaders in introducing wireless networks and services,[17] and their conversion of their wireline and wireless networks to digital technology allowed deployment of a wide range of vertical services, including voice mail and caller ID. ILECs are significant providers of broadband services to consumers (DSL) and to businesses (frame relay, ATM etc.).

B. SOME FORMS OF COMPETITION ARE MORE EFFECTIVE THAN OTHERS IN PROVIDING INCENTIVES FOR FIRMS TO INVEST

Innovation and investment in new technologies can be highly risky. Firms often must make large sunk investments in research, development and engineering before they have commercial products. Investments may be unprofitable because development efforts fail to produce the desired product or because the product fails commercially.

Firms earn profits from successful investments, but many investments are unsuccessful and those costs are not recouped. The possibility of earning (temporarily) high profits on a

---

14. FCC, MCI WorldCom Order, FCC 98-225, September 14, 1998, ¶64.
15. Ciena Press Release, "Sprint Increases Network Capacity, Performance with Deployment of Ciena's Scaleable 40-Channel Multiwave 4000," March 16, 1998 and Ciena CoreStream Dense Wavelength Division Multiplexing System, http://www.ciena.com/products/transport/longhaul/corestream/index.asp. Future increases in fiber optic infrastructure may not be as dramatic because there is substantial unused capacity today.
16. ILEC fiber optic deployment increased from 17.6 million fiber-kilometers of outside plant in 1995 to 39.5 million fiber-kilometers in 2001; FCC, Statistics of Communications Common Carriers, 2001/2002.
17. In the first half of 2002, Cingular and Verizon Wireless (the two companies affiliated with RBOCs) accounted for almost half the total earnings of the 24 publicly traded wireless companies; CTIA's Wireless Industry Indices, December 2002, Table 5.

successful innovation is part of the competitive process, and provides an incentive for taking risk. If a firm contemplates two investments and knows that, ex ante, only one likely will succeed, it will not undertake either investment if the successful investment will earn only a competitive return. Rather, the firm will require an above-average return on the successful project to compensate for losses on the unsuccessful project. In other words, it will undertake investments only if its expected overall return, adjusted for the risk of failure, is competitive.

Typically, a firm decides whether to pursue an innovation or investment opportunity knowing that it can use the tangible and intangible assets that it creates in whatever way it wants. Thus, it may decide to sell its successful innovation to another firm, or it may choose to patent its innovation and exploit it through licensing or through its own exclusive use. The right to unconstrained use of its investment assures the firm the greatest return.

Competition can stimulate investment by giving firms an incentive to develop a product or service that is preferred to that offered by competitors and potential competitors. The incentive effect of competition is weakened if a firm must sell its new technologies, equipment or facilities to competitors at prices that do not compensate for the risk that those investments will result in products or services that fail in the marketplace. Moreover, if competitors can "free-ride" on a rival's investments – making use of those investments only if they are successful and paying for access at prices that do not account for the ex ante risk – then their incentives to invest also may be weakened.

There is a significant risk that competition based on resale of ILEC services or on the use of unbundled elements of ILEC networks will not provide the appropriate incentives for investment. ILECs' incentives to invest are reduced if the resale rates do not compensate them for the costs and risks they face. CLECs' investment incentives are reduced if they can use the ILECs' investments at prices below the true cost of use. In contrast, when rivals invest in their

own facilities, ILECs will be motivated to upgrade their networks by fear of competition from rivals that offer more attractive products and services using their own facilities. Resale competition can only promote competition in marketing and customer services (and other economic functions performed by the reseller), not in the provision of network services and the development of new types of services.[18]

C. WHEN TECHNOLOGY IS ADVANCING RAPIDLY, REGULATION CAN CAUSE LARGE REDUCTIONS IN CONSUMER WELFARE.

Telecommunications regulation is divided between the FCC and the state Public Utility Commissions ("PUCs"). Decisions by these agencies can significantly affect innovation, investment and consumer welfare. If their policies reduce firms' investment and innovation incentives, then the development and introduction of new products and services that benefit consumers and improve productivity may be delayed. Two examples of such interference are the development of voice messaging (or voice mail) and the licensing of the cellular spectrum.

Voice Messaging

In 1980, AT&T was preparing to offer voice-messaging service. However, the FCC ruled that AT&T could offer enhanced services, such as voice mail, only through structurally separate affiliates. AT&T requested a waiver of the requirement with respect to voice mail and related services. It argued that the provision of these services was closely integrated with the

18. The danger of forced unbundling with government-determined rates has been described recently by Alfred E. Kahn: "The expansiveness of the FCC's definition of the elements of incumbent telephone company networks that it requires them to make available to entrants and its presumption in prescribing charges equivalent to the results that in its (mistaken) judgment would flow from efficient competition not only flatly discourages facilities-based competition but, as applied to new and extraordinarily expensive facilities, requiring costly and risky investments in latest technologies, conflict directly with the Schumpterian requirements for dynamic competition." Kahn, Alfred E., "The Deregulatory Tar Baby: The Precarious Balance Between Regulation and Deregulation, 1970-2000 and Henceforward," 21 J. Regulatory Economics (2002), p. 53.

provision of standard local telephone services, and that it would take years to redesign the services so that they could be offered through a structurally separate entity. When the FCC denied the waiver, neither AT&T nor other firms introduced voice messaging. In 1986, the FCC reversed itself, admitting that its policies had "completely foreclosed [voice mail] to the public."[19] Voice messaging finally was introduced in 1990, after additional delays caused by the AT&T divestiture decree and regulations on the Bell operating companies.[20]

Wireless Service

The FCC is widely regarded as delaying the introduction of cellular wireless services by failing to take decisive action to license the required spectrum for providing this service. George Calhoun noted that:

> [C]ellular technology should have reached the marketplace by the early 1970s, but it was not until the mid-1980s that the first commercial systems became operational in the United States. This delay of from ten to fifteen years has been blamed on many factors, but mobile industry executives commonly cite "regulation" as the source of their woes. … [F]rom the First Report and Order on Docket 18262 in 1970, which established the claim to the spectrum and cleared the broadcasters out of the way, until the decision on Docket 79-318 in March 1982, which established the licensing procedures, cellular radio passed through twelve tortuous years of further inquiries, petitions, comments, judgments, challenges, reconsiderations, and lawsuits before the technology was even in a position to be licensed.[21]

During those twelve years of delay, commercial cellular services became available in the Nordic countries,[22] Japan and elsewhere. [23]

---

19. Computer III Order, 104 FCC 2d 958 (1986), ¶90.
20. Hausman, Jerry, "Valuing the Effect of Regulation on New Services in Telecommunications." Brookings Papers on Economic Activity, 1997.
21. Calhoun, George, Digital Cellular Radio (cited in the FCC's First CMRS Competition Report). Artech House (Norwood, MA): 1988, pp.49-50.
22. International Engineering Consortium, "Introduction: The Evolution of Mobile Telephone Systems," http://www.iec.org/online/tutorials/gsm/topic01.html.
23. Davis, John H., "Cellular Mobile Telephone Services," in Managing Innovation: Cases from the Services Industry, Guile, Bruce and James Quinn (eds.), National Academy of Engineering Series on Technology and Social Priorities, National Academy Press, Washington, D.C., 1988, p.158.

Professor Jerry Hausman has studied the impact on consumer welfare of regulatory impediments to development of voice messaging and cellular service. He estimates that lost consumer welfare from the FCC's delayed approvals exceeded $1 billion per year for voice messaging and $33 billion per year for cellular service.[24]

D. REGULATORY POLICIES THAT DISCOURAGE INVESTMENT IN THE TELECOMMUNICATIONS SECTOR COULD CAUSE ECONOMIC HARM

Economists have studied the benefits to consumers from new telecommunications services and technologies including cable and satellite services, broadband Internet access, cellular wireless services and voice messaging. The studies find that these services contribute billions of dollars in consumer welfare.[25]

Many studies have documented the benefits of increased productivity in Information Technology ("IT") industries (and telecommunications constitutes a large portion of the IT sector). According to the Department of Commerce, relatively IT-intensive industries accounted for virtually all productivity growth between 1989 and 2000.[26] Another recent study by Cronin, et al finds that an average of 25 percent of total U.S. efficiency gains between 1975 and 1991 is attributable to telecommunications infrastructure investment alone.[27]

---

24. Hausman, Jerry, "Valuing the Effect of Regulation on New Services in Telecommunications;" Brookings Papers on Economic Activity: Microeconomics, 1997.
25. See, for example, Litan, Robert E. and Alice M. Rivlin, "Projecting the Economic Impact of the Internet," American Economic Review (March 2001), 313, 316. As noted above, Professor Jerry Hausman finds significant consumer welfare gains from introduction of new telecommunications services.
26. Department of Commerce, *Digital Economy 2002*, February 2002, Tables 3.1 and 4.1.
27. Cronin, Francis; Elisabeth Colleran; Paul Herbert; and Steven Lewitzky, "Telecommunications and growth: The contribution of telecommunications infrastructure investment to aggregate and sectoral productivity." Telecommunications Policy, December 1993, p. 688.

Various studies show that for some industries, even those that are not particularly "high tech," the benefits from increases in IT productivity, including telecommunications productivity, are large. For example, Cronin, et al estimate that "without advancements in telecommunications, productivity gains in the wholesale and retail trade sector over the 1963-91 period would have been 87 percent lower than actually experienced." A similar conclusion is reached in a McKinsey Global Report on the increase in U.S. productivity growth between the periods 1987-95 and 1995-99. That study finds that 20 to 40 percent of the increase in productivity growth in the retail sector during this period is attributable to IT, and that retail trade alone contributed one-fourth of the gain in total U.S. productivity growth between 1987-95 and 1995-99.[28]

Thus, reduced incentives to invest in telecommunications infrastructure and services could result in considerable economic harm. As noted earlier, economist Dale Jorgenson concludes that total factor productivity growth tripled during 1995-1999, largely due to improvements in information technology. Telecommunications investment benefited the U.S. economy both directly, through consumer welfare gains from new services, and indirectly, by increasing productivity in other sectors.[29] As a result, as Jorgenson and Stiroh warn, declines in productivity in the IT sector can also have direct and indirect effects:

> Should the pace of technological progress in high-technology industries diminish, economic growth would be hit with a double whammy: slower TFP growth in important industries that produce high-technology equipment, and slower capital accumulation in other sectors that invest in and use that equipment. Both factors have made important contributions to the recent success of the U.S. economy, so that any slowdown would retard future growth potential.[30]

---

28. McKinsey Global Institute, US Productivity Growth 1995-2000, Washington D.C., October 2001, Retail Trade, p. 1, 16.
29. Cronin, F., E. Colleran, P. Herbert and S. Lewitzky, "Telecommunications and growth: The contribution of telecommunications infrastructure investment to aggregate and sectoral productivity." Telecommunications Policy, December 1993.
30. Jorgenson and Stiroh, supra note 1, p. 185.

III. INAPPROPRIATELY APPLIED RESALE AND UNBUNDLING REGULATION CAN SLOW INTRODUCTION OF NEW TECHNOLOGIES AND HARM THE ECONOMY

The Telecommunications Act of 1996 called for a dramatic overhaul of telecommunications regulation in order to promote competition in all telephone services, including those that historically had been government-protected monopolies. A goal of the Act was to eliminate ILECs' monopoly of local exchange services and to create conditions under which competition from new providers of local exchange service would give consumers higher quality and lower cost local telephone service.

Rules specifying conditions and prices under which ILECs are obligated by the Act to offer network elements to their rivals have been continuously debated, litigated and revised since 1996. The Commission's Opinion in the Triennial Review proceedings is the most current, but certainly not the last, word on these issues. It is our view that the unbundling requirements that the FCC has imposed, including many of those specified by the FCC's Triennial Review order, generally threaten further technological gains by adversely affecting ILECs' and CLECs' incentives to invest in providing new services and upgrading their networks. This, in turn, could harm consumer welfare.

A. THE FCC'S TELRIC METHODOLOGY FOR PRICING UNBUNDLED NETWORK ELEMENTS

The Telecommunications Act recognized that the historical entrenchment of ILECs, with their extensive physical infrastructure and customer relationships, would not disappear overnight. The Act and the FCC determined that it could be inefficient for new entrants to duplicate immediately all components of the local exchange network, such as the local loop. The FCC recognized that two forms of competition could help achieve the consumer benefits anticipated in the Act: facilities-based competition, where entrants construct their own facilities and use these to compete against the ILECs, and resale competition, where entrants purchase services or

network components from the ILECs and use them to compete. The FCC recognized that, although both forms of competition have merit, the greatest consumer benefits come from facilities-based entry.

In order to encourage facilities-based competition, the FCC mandated that ILECs offer various parts of their networks to competitors. The intent was that entrants could purchase certain network elements from ILECs, and then add their own facilities and service to compete with ILECs. Thus, the FCC expected entrants to begin to offer facilities-based local exchange competition without having to duplicate the entire local exchange network.

The FCC was charged by the Act with establishing prices at which ILECs would sell network components to competitors. The Act and subsequent regulations established the Total Element Long-Run Incremental Cost ("TELRIC") framework for setting these prices, with implementation of the TELRIC methodology left to the states.

The FCC's TELRIC methodology was intended to reflect forward-looking costs for providing a given network element (e.g., a local loop or switching service) to an ILEC's competitors. The FCC's intent was to provide a framework, but to leave implementation of that framework to individual state PUCs that, presumably, had the greatest information about the actual costs that factored into the TELRIC formula. The TELRIC methodology was intended to reflect the costs that an efficient firm building a new network would incur to provide a given network element, assuming that other network elements also were efficiently provided. The TELRIC methodology explicitly ignored historical ILEC investments in the existing network, as well as the fact that, even under competitive conditions, firms would not instantaneously replace existing infrastructure with new technology.

The FCC has been primarily responsible for determining which network elements ILECs must provide and when competitive circumstances justify removal of these obligations. The

FCC, industry analysts and economists recognized that the benefits of deregulation for consumers would be greatest from facilities-based entry. Resale and the purchase of UNE-P (local loops, transport and switching, the core unbundled elements together referred to as the UNE-Platform, or UNE-P) were intended as transitional obligations leading to facilities-based competition.

The Act required the FCC to review every three years the public interest in requiring that each element continue to be unbundled. As entrants became better established and gained more customers and as technology changed, certain unbundled network elements could be eliminated and entrants would supply those elements themselves.

B. PROBLEMS WITH TELRIC PRICING

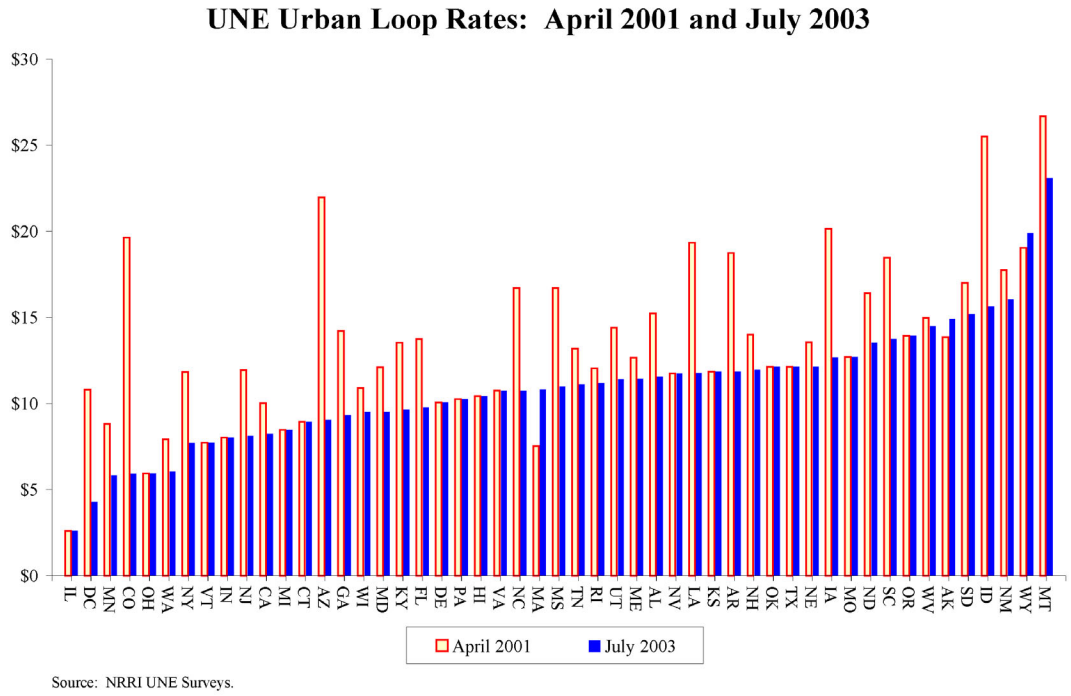
Each PUC sets TELRIC prices in its state based on information provided by the ILEC, its competitors and other interested parties. The result of this rate-setting process has been that TELRIC prices vary widely across states and frequently change abruptly and dramatically.

1. Large Variation in TELRIC Prices

There is wide variation in UNE rates for local loops in urban areas. In Illinois, the rate per line is $2.59 per month while the next lowest rate of $4.29 is in Washington, D.C. The national average is $10.92, with Montana charging the highest price for an urban loop at $23.10.[31] (See Figure 1.) There is similar wide variation in UNE-P rates for urban areas across states. (See Figure 2.)

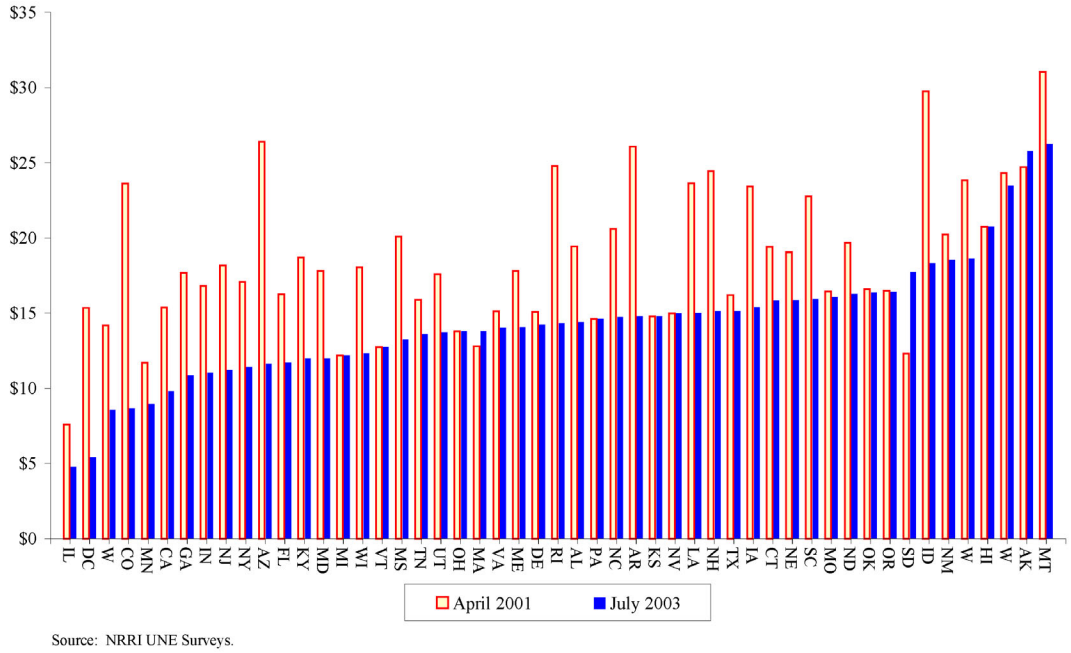
31. National Regulatory Research Institute, "UNE Surveys," July 2003.

Figure 1



Source: NRRI UNE Surveys.

Figure 2



Source: NRRI UNE Surveys.

While we would not expect identical prices across states, the observed variation appears to be too great to result from differences in costs alone, since the TELRIC methodology is forward-looking and should reflect the costs that an efficient firm would incur to provide an element, if the rest of the network also were efficiently provided.[32]

Moreover, the abrupt and large changes in TELRIC rates that have occurred in the past could not have occurred if TELRIC rates everywhere were based on the FCC's methodology without any arbitrariness or unpredictability. Many states have lowered rates that ILECs can charge for unbundled network elements in the past few years, some several times but in no consistent fashion. For example, Arkansas dropped its rural loop rate from $71.05 per line per month to $23.34 between April 2001 and July 2002, a reduction of 67 percent.[33] In Washington D.C., the urban loop rate was reduced from $10.81 per line per month to $4.29 between July 2002 and July 2003, a 60 percent reduction, while the rate for the same element in Arizona was reduced from $18.96 to $9.05. These reductions suggest that prices are set inconsistently and that changes in prices reflect factors other than cost considerations. State PUCs appear to have discretion in setting rates under the FCC formula, with rates subject to challenge only through lengthy and costly litigation and/or legislative oversight.

32. The FCC's recent Notice of Proposed Rulemaking addressing the TELRIC methodology made a similar point, noting that "such variable [TELRIC prices] may not reflect genuine cost differences but instead may be the product of the complexity of the issues, the very general nature of our rules, and uncertainty about how to apply those rules." (FCC, Notice of Proposed Rulemaking in the matter of Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers, September 15, 2003, WC Docket No. 03-173, ¶6.)
33. National Regulatory Research Institute, "UNE Surveys," April 2001, July 2002, and July 2003.

The states' failure to implement the TELRIC methodology consistently is clear from the history behind the establishment of rates for some UNEs. [34] In several states, ILECs agreed to UNE rate reductions in order to obtain approval from the state PUC or the FCC to offer long distance services. For example, in 2002, the Maryland Commission found that, although Verizon was in "technical compliance" with the required checklist for offering long-distance, including TELRIC compliance, its UNE rates would "not adequately promote full-scale market entry in Maryland." Accordingly, the Maryland Commission required Verizon to reduce its loop rate and unbundled switching rate.[35] Similarly, the Washington D.C. Commission approved reductions in Verizon's UNE rates, but noted that its approval "was not a determination of whether the rates are TELRIC-compliant, cost-based, or just and reasonable."[36]

Recent experience in Illinois shows that even state legislatures exercise limited oversight of UNE rates. In May 2003, the Illinois General Assembly passed, and the Illinois governor signed into law, legislation to increase wholesale rates by requiring the state PUC to adjust various components of the TELRIC formula, effectively raising UNE-P rates in Illinois (which as seen in Figures 1 and 2 have been the lowest in the United States). The Courts have enjoined this action as a violation of the rate-setting procedures outlined in the 1996 Act.

---

34. In order to obtain permission to offer long distance service under §271 of the 1996 Telecommunications Act, the FCC must certify that the RBOC's UNE rates are TELRIC compliant – reflect reasonable application of TELRIC principles. Of the 35 states (including Washington, D.C.) in which the FCC has approved a 271 application since the beginning of 2001, the FCC found that in over 70 percent of the states "there was a major methodological mistake or incorrect input or several smaller mistakes or incorrect inputs that collectively could render rates outside the reasonable range that TELRIC would permit". *See,* for example, FCC, Maryland, Washington, D.C. and West Virginia 271 Order, FCC 03-57, March 19, 2003, ¶73; Verizon Pennsylvania 271 Order, 16 FCC Record at 17453, ¶¶55, 63, 65; Rhode Island 271 Order, FCC 02-03, February 22, 2002, ¶27.
35. FCC, Maryland, Washington, D.C. and West Virginia 271 Order, FCC 03-57, March 19, 2003, ¶47.
36. FCC, Maryland, Washington, D.C. and West Virginia 271 Order, FCC 03-57, March 19, 2003, ¶54.

Historical rate changes and rate variation across states suggest that regulators exercise significant discretion is establishing prices for network elements. State regulatory proceedings result in UNE prices that do not strictly reflect the forward-looking costs of an efficient firm. TELRIC prices must be set incorrectly in at least some states, given the wide variation in rates across states and the large, abrupt rate changes in some states.

2. The TELRIC Methodology Has Not Fully Reflected All Forward-Looking Costs.

The Telecommunications Act directed the FCC to issue guidelines for states to use in setting prices of UNEs. The FCC's TELRIC methodology, recently modified in the FCC's Triennial Review Order and under review in a new FCC proceeding, requires UNE prices to be based on the cost of building an efficient network using the best available technology. The FCC argued that this methodology replicates pricing forces in a competitive market.

Many analysts have noted that the FCC's methodology is flawed. In particular, they explain that TELRIC rates do not properly reflect all forward-looking costs, and thereby fail to provide a return sufficient to encourage investment in new technology. Analysts also have stressed that rapid technological change greatly complicates the regulators' task of determining how a hypothetical efficient network would be configured under competitive circumstances. Analysts also have criticized the TELRIC methodology, as developed by the FCC, for not fully accounting for uncertainty associated with investment decisions, and so for failing to provide a return to the ILEC such that investment in new technologies and facilities would be profitable over its assumed life.

The TELRIC methodology has problems in its implementation, as well as conceptual problems in design. First, in implementing the methodology, state PUCs must properly account for economic, and not simply physical, obsolescence. It is wrong to assume that a network with a physical life of 20 years will earn a return for 20 years if advances in telecommunications

technology will make the network or network element technologically obsolete within three years. In theory, this economic obsolescence could be taken into account in setting TELRIC rates, although in practice it may be difficult to predict the economic life of assets subject to rapid and unpredictable obsolescence.

Although ILECs must unbundle certain network elements and offer them to rivals, competitors will want to buy only the elements used to provide successful services. When ILECs offer network elements resulting from successful investments to rivals at TELRIC rates, they will not cover costs associated with unsuccessful projects. That is, the TELRIC approach does not fully account for risks faced by ILECs in developing successful services.

The FCC's Order in the Triennial Review proceedings and its recent initiative to reexamine its TELRIC methodology appear to acknowledge limitations of its current approach to pricing network elements. While we are encouraged by the FCC's decision to reevaluate TELRIC, it is unclear when and how appropriate adjustments to the TELRIC methodology will be implemented. Prior experience, however, suggests that the development of pricing rules will remain subject to wide regulatory discretion.

3. Entrants' Reliance on UNEs in the Presence of Regulated Retail Rates

To date, most CLEC entry has occurred through resale and purchase from ILECs of UNE-P. Entrants now use UNE-P to serve a significant number of residential customers. For example, CLECs serve 24 percent of residential access lines in New York, 21 percent in Rhode Island and Michigan, 19 percent in Illinois and 17 percent in Nebraska.[37]

Some CLECs have deployed their own facilities, often using some unbundled elements (such as the local loop) while supplying other elements themselves (such as switching). They

37. FCC, Local Competition Report, June 3, 2003, Tables 6 and 11. These figures include lines provided by CLECs by methods other than UNE-P. We understand, however, that most residential CLEC customers are served through UNE-P.

have done so primarily to service business customers, who tend to be densely located and (due in part to state regulation of retail rates) generate higher margins than those of residential customers.

The Act did not change the historical regulation of retail rates, which are set by state PUCs. Regulated retail rates for telephone services typically include subsidies for certain consumers. Differences between retail rates in urban and rural areas do not fully reflect differences in the cost of serving the two groups of customers. This creates opportunities for entrants to engage in "cream-skimming" by serving only customers who generate high retail margins. Since regulated retail rates do not fully reflect the costs of serving different customers, entrants that are less efficient than the ILECs may be able to profitably serve customers with high margins. This type of entry makes it hard for incumbents to sustain their operations at existing regulated rates. As two economists have explained, "[a]s selective entry takes place and picks off the high-margin customers who provide the source of funds to subsidize those negative-margin activities, there is a revenue shortfall."[38]

Based on our review of UNE-P pricing described above, we are concerned that UNE-P prices do not adequately compensate ILECs in some states. In addition, we are concerned that cross-subsidies in retail rates -- combined with TELRIC-based prices for network elements -- can attract inefficient entry. This could reduce ILECs' investments in maintaining and upgrading their networks and delay introduction of new technologies by both the ILECs and CLECs, thereby harming the economy.

---

38. MacAvoy, Paul and Gregory Sidak, "What is Wrong with American Telecommunications?" in Competition and Regulation in Telecommunications: Examining Germany and America, edited by Sidak, Engel and Knieps, December 2000, p.73.

C. THE CURRENT REGULATORY CLIMATE CAN REDUCE INCENTIVES FOR FIRMS TO INVEST IN TELECOMMUNICATIONS.

Firms will not invest in new facilities or maintain or upgrade existing facilities if they must provide their competitors access at unremunerative rates. If TELRIC rates are too low, ILECs will not upgrade their networks appropriately. If TELRIC rates are too low, CLECs will find it more profitable to purchase UNEs than to construct their own facilities, even if CLECs are more efficient than the ILEC whose UNEs they purchase.[39]

Uncertainty about future unbundling requirements, and about the criteria that will be used in a particular location to determine whether such requirements will be lifted, can reduce investment incentives. We believe that the FCC's decision in the Triennial Review does little to resolve this regulatory uncertainty and may increase it. Indeed, there are inherent contradictions in the FCC's proposed guidelines to the states regarding when unbundling requirements can be eliminated. For example, the FCC suggests that switching need not be provided by ILECs on an unbundled basis in areas in which more than a given number of CLECs operate facilities. However, if regulated TELRIC rates in the area are sufficiently low, then little or no facilities-based CLEC entry may occur and, according to the FCC guidelines, ILECs must continue to offer switching on an unbundled basis. However, if higher TELRIC prices induce sufficient entry in another area, then the FCC guidelines imply that switching need not be unbundled. That is, CLECs may not enter in an area with their own facilities because TELRIC prices are favorable to them, and not because facilities-based entry is uneconomical.

---

39. This implies that the standard set out in the Triennial Review order for eliminating the unbundling requirement – that there is evidence of successful facilities-based CLEC entry in an area – is inappropriate when UNE rates are too low. CLECs will not build facilities, even if they could do so more efficiently than can the ILECs, if they can purchase UNEs at below-cost rates. Thus, UNE rates that are too low prevent regulators from observing the market evidence (of entry) they need to lift the unbundling requirement.

The approach to defining ILECs' obligations for providing unbundled network elements laid out in the decision also is likely to be subject to protracted litigation. Chairman Powell recognized this when he said in his dissent that the FCC's Order "flouts the law" by failing to clarify when ILECs are required to provide switching on an unbundled basis.

VI. CONCLUSION

There have been dramatic increases in innovation and investment in the telecommunications sector, which have resulted in large productivity gains, introduction of many new products and services and widespread consumer benefits. The current regulatory environment, characterized by extensive unbundling requirements and uncertainty regarding pricing of unbundled network elements, may lead to lower returns on and greater riskiness of investments by telecommunications firms. The resulting harm to the U.S. economy could be large and could extend beyond the telecommunications sector. The current regulatory climate increases the risk that the vibrancy of the telecommunications industry will be reduced and consumers will be harmed.

As explained in this report, we conclude that:

- Regulation should promote facilities-based competition. Entry based on UNE-P and resale of ILEC services enhances competition only for marketing, customer service and related functions, unless it facilitates the transition to facilities-based competition. If CLECs can purchase unbundled network elements indefinitely, it could discourage investment in facilities by both ILECs and CLECs.
- Regulations that reduce the incentive of ILECs to upgrade their networks and introduce new products are likely to have the greatest adverse effect on consumer welfare during periods, like the present, of rapid technological change. Even modest delays in new product introduction can have significant adverse effects on consumer welfare.

- Periods of rapid technological progress complicate regulators' ability to set economically appropriate prices for network elements. These prices should reflect the economic life of investments, which can be shorter than the investments' physical lives due to competition from new and competing technologies. In addition, pricing of network elements should reflect ex ante risks associated with all investments, not simply successful investments. The wide disparity in the pricing of similar unbundled networks elements in different states suggests that regulators exercise great discretion and that ILECs and CLECs often do not face economically appropriate prices.
- Cross-subsidies in state-regulated retail rates create opportunities for firms to provide local telephone service using unbundled network elements, even if the entrants are less efficient than ILECs. This discourages investment by ILECs and impairs their ability to sustain their operations.

While the FCC's Order in the Triennial Review proceeding acknowledges many of these principles, we are concerned that the regulatory climate now faced by ILECs deters investment and new products introduction which in turn harms consumers and adversely affects productivity.